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INSECTICIDE COMPOSITION COMPRISING NAPHTHALENE AND PARAFFINIC HYDROCARBON

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This invention relates to an improved insecticide composition. It particularly relates to an improved composition for killing noxious insects, such as clothes moths, larvae, carpet beetles, wood worms, mites, and the like. It especially relates to an improved moth ball comprising mainly petroleum-derived naphthalene plus a specific additive which imparts unique properties to the moth ball.

It has heretofore been known that naphthalene has been useful as an insecticide particularly in the killing of moths which infest certain types of clothing. Basically naphthalene is a fumigant whereby the insect is killed by contact with the vapors of the insecticide. The term "moth ball' has become a household byword for use in preserving wearing apparel from the ravaging effects of moths. Howexer, conventional moth balls have several objectionable drawbacks from the standpoint of the consuming public. For instance, when moth balls are packaged, there is a tendency for the package to contain a considerable quantity of flakes which chip off from the balls during the packaging and merchandising operations. Additionally, the moth ball frequently contains a "dust" over its entire surface which wipes off onto the clothing which is being protected and onto the hands of the user. Further, conventional moth balls have a tendency to change from the expected all-white color to a much darker color upon storage over relatively short periods of time. This color degradation has an adverse effect on the marketability of the moth ball. Still further, conventional moth balls have a noticeable serpentine effect which results from cracking or splitting of the ball. In some cases, the moth ball has a tendency to crumble or disintegrate into smaller particles.

In recent years it has become known that naphthalene could be obtained from petroleum sources in addition to the coal tar sources. Petroleum-derived naphthalene is obtained by a technique embodying thermal or catalytic dealkylation of alkylnaphthalenes which have been concentrated from well-known petroleum stocks, such as catalytic gas oil. Even though petroleum-derived naphthalene is of ultra-high purity, to wit, it has a melt point usually exceeding 80° C., and a white color; the processing of the naphthalene into moth balls further aggravates the above-mentioned problems in making a marketable product. In other words, moth balls made from petroleum-derived naphthalene have a greater tendency to flake, have a greater tendency to crack or split apart, have a greater tendency to form dust, and have a greater tendency to turn darker color upon aging than moth balls made from coal tar naphthalene.

It is an object of the invention to produce a composition of matter which is useful as an insecticide. It is another object of the present invention to produce a moth ball having improved properties. Another object of the invention is to provide a process for making a substantially dust-free, non-flaking, color stable, moth ball from petroleum-derived naphthalene. It is another object of the invention to produce a moth ball from petroleum-derived naphthalene which has improved properties as an insecticide.

These and other objects are achieved according to the present invention by blending into naphthalene a critical amount of normally liquid paraffinic hydrocarbon. In

general, the amount of paraffinic hydrocarbon which is blended into the naphthalene is from 0.25% to 3% by weight, preferably from 0.5% to 2% by weight. It has been found that if the amount of paraffinic hydrocarbon is less than 0.25%, the benefits of the present invention are not substantially obtained. In a similar manner, if the amount of paraffinic hydrocarbon which is blended into the naphthalene exceeds 3%, the moth ball will have a tendency to feel oily and will leave a residue on the clothing which it is protecting from the action of the moths. This adverse feature makes such a moth ball completely undesirable even though the other benefits of the invention are substantially obtained.

In general, the benefits of the present invention may be achieved if the freezing point of the charge naphthalene is depressed between 0.1° C. and 1.0° C., preferably 0.5° C. It has been found that the freezing point can be depressed 0.1° C. for each 0.25% of additive mixed therewith.

The paraffinic hydrocarbon which is used in accordance with the present invention boils within the range of 65° C. to 320° C., preferably from 160° C. to 275° C. Illustrative of those paraffinic hydrocarbons which are suitable for the practice of the present invention include aviation alkylate, heavy alkylate, the paraffinic extract obtained as by-product from the solvent extraction of catalytic reformates, and the like. It is preferable that the paraffinic hydrocarbon which is used for the practice of this invention have a vapor pressure equal to or less than the vapor pressure of naphthalene measured at the same temperature, e.g., 100° C. Other properties which would characterize suitable paraffinic hydrocarbons for use in the present invention include an API gravity of from 45–75, a Reid vapor pressure of from 0–5 pounds, and an aromatic content of less than 10% by volume.

As used herein, the term "paraffinic hydrocarbon" includes a hydrocarbon containing primarily paraffinic constituents which may contain up to 10% by volume aromatic-type hydrocarbons. If the paraffinic hydrocarbon contains more than 10% aromatics, the resulting naphthalene would lose its characteristic naphthalene odor and would be tainted with the undesirable aromatic odor.

Additionally, it should be recognized that the use of any significant amount of aromatic hydrocarbons as an additive to naphthalene would make the cost of the moth ball prohibitive.

The paraffinic hydrocarbon may be blended into the naphthalene by any means known to the art. However, it is preferable that the naphthalene be heated until it is in a liquefied state and then the paraffinic hydrocarbon added while using sufficient agitation to insure a homogeneous blend.

The charge material which is used in the practice of this invention is petroleum-derived naphthalene having a freezing point of from 79.3° C. to 80.18° C. Typical properties of a suitable naphthalene charge material are as follows:

Freezing point, ° C.	minimum	79.8
Indene, wt. percent	maximum	0.02
Benzothiophene, wt. percent	do	0.04
Sulfur, wt. percent	do	0.01
Methyl naphthalene, wt. percent	do	0.30
Non-volatiles, wt. percent		nil
Color		white

Example 1

Illustrative of the present invention is the following data: petroleum-derived naphthalene, having the above-disclosed typical properties, was liquefied by heating to a temperature of approximately 100° C. Approximately

1.0% by weight of paraffinic hydrocarbon, having the following properties, was added thereto:

° API		53.8
IBP	° C.	182
10%	° C.	185
90%	° C.	218
End point	° C.	270
Acid absorption		2.3

Percent aromatics, essentially none.

The above mixture was cooled and processed into naphthalene flakes. The flaking operation was performed on the surface of a cooled, revolving drum. A knife or doctor held firmly against the drum removed the solidified naphthalene as flakes. These flakes were carried into a ball-mill machine which compressed the flakes into moth balls. The average diameter of the moth ball was ⅝ of an inch. It was found that the moth ball diameter had to be at least ¼ of an inch in order to achieve the benefits of the present invention. Normally moth balls will not exceed one inch in diameter.

The resulting treated moth ball had essentially no dust on its surface, had the characteristic naphthalene odor, was characteristically white in color, had no noticeable pits or cracks, and did not have an oily feel. After processing through the production line for the packaging of moth balls, it was found that there were less flakes per package than had been noticed heretofore from moth balls which did not contain any added paraffinic hydrocarbon. Further, it was also noticed that the sublimation rate of the improved moth ball was significantly slower than the rate of moth balls containing no paraffinic additive. This results in a significantly longer shelf-life for the moth balls.

Example 2

A sample of the petroleum-derived treated naphthalene from Example 1 and a sample of conventional, untreated naphthalene having a white color were placed under storage conditions in the presence of sunlight for approximately six weeks. The untreated naphthalene turned brown in color whereas the treated naphthalene had no noticeable degradation in color.

The invention claimed is:

1. Moth balls comprising naphthalene admixed with 0.25% to 3% by weight of normally liquid paraffinic hydrocarbon boiling within the range of 65° C. to 320° C.

2. Moth balls according to claim **1** wherein said paraffinic hydrocarbon has an A.P.I. gravity of from 45 to 75, a Reid vapor pressure of from 0 to 5 lbs. and an aromatic content of less than 10% by volume.

3. Moth balls according to claim **1** wherein said naphthalene is derived solely from petroleum sources.

4. Moth balls according to claim **3** which has a melting point of at least 79° C.

5. Moth balls according to claim **4** wherein said paraffinic hydrocarbon has an A.P.I. gravity of from 45 to 75, a Reid vapor pressure of from 0 to 5 lbs. and an aromatic content of less than 10% by volume.

6. Moth balls comprising petroleum-derived naphthalene admixed with 0.5% to 2% by weight of normally liquid paraffinic hydrocarbon boiling within the range of 160° C. to 275° C.; said moth balls having melt point between 79° C. and 80° C.

7. Moth balls according to claim **6** wherein said paraffinic hydrocarbon has an A.P.I. gravity of from 45 to 75, a Reid vapor pressure of from 0 to 5 lbs. and an aromatic content of less than 10% by volume.

8. Process for making substantially dust-free and color stable moth balls which comprises:

(1) liquefying petroleum-derived naphthalene having a melting point of from 79.3° C. to 80.18° C.,

(2) adding to said liquefied naphthalene from 0.25% to 3% by weight of normally liquid paraffinic hydrocarbon boiling within the range of 65° C. to 320° C.,

(3) solidifying the resulting admixture, and,

(4) shaping the solidified admixture into moth balls.

9. Process according to claim **8** wherein said paraffinic hydrocarbon boils within the range of 160° C. to 275° C.

10. Process according to claim **9** wherein the amount of paraffinic hydrocarbon added is sufficient to depress the free point of said naphthalene of from 0.1° C. to 1.0° C.

11. Process according to claim **9** wherein said paraffinic hydrocarbon has an A.P.I. gravity of from 45 to 75, a Reid vapor pressure of from 0 to 5 lbs. and an aromatic content of less than 10% by volume.

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